cluding those of Crompton, Bürgin, Jaspar, and Serrin. Lamps adapted for use in series or derivation, including the so-called differential lamps, are considered in a separate chapter. Amongst the forms described are those of Gramme, Weston, Brush, Hefner-Alteneck (Siemens), Gülcher, and the Pilsen lamp. According to the author, the differential lamp of von Hefner-Alteneck was the first to make practical the introduction into one circuit of a number of lights. Jablochkoff's well-known candle, and its more recent imitations are described briefly, and then the author passes to the semi-incandescent lamps of the Werdermann type. Edison's incandescent lamp is next described, as it was in the year 1879. All Edison's more recent improvements appear to be unknown to the author, who passes by the Edison exhibit at the Paris Exposition with a compliment upon the good quality of its colour! The incandescent lamps of Lane-Fox and of Maxim are both described and figured, whilst that of Swan—antecedent to both of the latter, as well as to Edison's carbonised filament lamp—is described only, and not figured. Details concerning driving-power, distribution, cost, and fire-risks follow. Applications of dynamo-electric machines to metallurgy, electro-chemistry and telegraphy, make a chapter in themselves, as also does the subject of the electric transmission of power. A penultimate section deals with storage batteries, in which we are glad to observe that full justice is done to Planté, the inventor of the accumulator. A rather sketchy chapter on the mathematical theory of electric arc lighting closes the work.

On the whole, though this work contains useful information on many points, it is much to be regretted that it is not so complete as might have been hoped of a book published in 1882. In a science whose applications are developing so fast, this incompleteness detracts greatly from the value of the work.

OUR BOOK SHELF

The Watchmaker's Handbook. By Claudius Saunier. English Edition, Translated, Revised, and considerably augmented by Julian Tripplin and Edward Rigg, M.A.

THERE is no trade, we suppose, in which so many special tools are used as in watchmaking, nor any in which the character of a workman is so readily distinguished by them. The good workman has good tools—a perfect army of them—nearly all self-made, with which he is prepared to execute any piece of work, in a neat, clean, and efficient manner.

This little book describes watchmakers' tools, but deals with many operations inadmissible from a manufacturer's point of view. "Every watchmaker," says the preface, "will at once recognise that receipts are included which are of the nature of makeshifts, and that it would in many cases be better to replace a piece by a new one, rather than to repair it it in the manner indicated." But there is good reason for this :—"The immense number of badly-constructed watches that he (*the workman*) is called upon to put in going order for a trifling remuneration, compels him to replace the older methods of procedure by others, whenever by so doing time can be saved."

If watches were as big as steam-engines there are few people who would not be horrified at the kind of work put into some of them. But they go well? so they may (or may not), thanks to a strong mainspring, until they are pulled to pieces.

All watch repairers, or "jobbers," as they are technically called, and manufacturers too, ought, however, to be interested in this book. It contains a great deal of useful and instructive information, and it must be left to the consciences of such as to the suggestions herein contained, they would, or would not, adopt.

H. DENT GARDNER

Descriptiones Plantarum Novarum et minus Cognitarum. Fasc. viii. Auctore Dr. Regel. Pp. 150. (St. Petersburg, 1881.)

THE Director of the Imperial Botanic Garden describes a number of novelties cultivated under his own eye. One of the most striking is a new Crinum, (*C. Schmidti*) from Port Natal, which scarcely seems separable by description from *C. latifolium*, L. The bulk of the pages, however, is filled with an enumeration of the glumaceous plants at present known from Central Asia, in the study of which Aitchison's Afghan collections have not been overlooked. 195 species of Gramineæ are enumerated, of which 79 are Asiatic, or at any rate are not known from Europe; 75 species are middle European or Mediterranean; and 37 are common to middle Europe, middle Asia, and North America.

Turning over Dr. Regel's pages affords a ready illustration of the wide diffusion of the components of the British flora. Without pretending to absolute accuracy, we noted that of the 109 species of the British gramineous flora, 65 are recorded by Dr. Regel from Central Asia. We looked with some curiosity to see if any light was thrown on the origin of our cereals. But though rye (*Secale cereale*) appears to occur in a wild state in Turkestan, the forms of wheat met with by botanical collectors were all represented by cultivated specimens. Dr. Regel does not seem to have met with, from Central Asia, *Fingerhuthia Africana*, obtained by Aitchison in his second journey; although only known to botanists from South Africa, it was found to be one of the chief fodder-grasses of the Lower Kuram Valley.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

The Spectrum of the Light emitted by the Glow-worm

I AM not aware that any account has been published of the nature of the light emitted by the glow-worm, and therefore venture to send the results of some observations I made on the evenings of the 21st and 22nd of the month.

The light, as is well known, proceeds from the lower surface of the penultimate and ante-penultimate segments of the lower abdomen of the insect, and also from two round spots on the last segment—it is of a greenish colour, and when examined with the spectroscope gives a short continuous spectrum extending from about C to *b*, and therefore containing rays of all wave-lengths between 656 and 518—the more refrangible portion is far the brightest, and the general appearance is of a broad band of green light reaching from about 587 to 518, with a faint continuous spectrum extending down into the red.

I may add that the observations were made with a small direct-vision spectroscope, with a photographic scale; and also that glow-worms are extremely rare in this district.

Reading, July 29 JOHN CONROY

Oscillations of the Sea-level

It seems to be very generally assumed that the surface of the ocean attains a uniform level, or nearly so, in all lands, and forms a sort of zero-point or datum line, from which the altitude

of mountains is calculated, and to which barometrical readings are reduced.

This assumption, however, is called in question by several mathematicians, who allege that the sea-level is by no means that of a regular spheroid, as is generally supposed, but may vary many hundreds of feet in level even along the same parallel of latitude, quite independently of the temporary action of winds or of ocean currents.

According to the law of gravitation, all substances attract one another with a force proportional to their masses. A continent of land will therefore exert an attractive influence upon the sea, and cause it to rise upon its shores to a height which will vary according to the mass of land that causes the attraction, and may amount, it is said, to as much as 1000 metres above the level to which the sea attains in mid-ocean. This extraordinary result is deduced by Ph. Fischer from a discussion of pendulum-observations, and somewhat similar conclusions are arrived at by Listing and Heinrich Bruns.

Founding upon these observations, a German geologist, Dr. Penck, has proposed an explanation of the phenomena presented by the raised beaches, and other tokens of oscillation in the sea-level, which are so conspicuous during the glacial period. If the land has the property of thus drawing the sea towards it in proportion to its mass, it follows that anything which adds to that mass will increase the effect, and thus a great thickness of glacier-ice laid upon a continent, will draw the water towards it, and raise the sea-level in its immediate vicinity; and, according as the ice increases or diminishes, so will the level of the sea rise or fall in proportion. Moreover, the altitude of the sea-beach may vary considerably, it is said, along the border of one and the same continent, by reason of the varying thickness of the ice in different parts. In this way it is conceived an explanation is found for the fact that in Norway the old terraces and sea-beaches do not coincide in level, but vary in altitude at places not very far distant from one another. The action of the ice may in short be so localised that its attractive force will vary considerably along the same line of coast.

These views are certainly somewhat different from those that have hitherto prevailed in regard to the regularity of the sea-level. If there is such a very great difference in the height to which the surface of the sea may attain in different places, the barometer should give more indication of it than it seems to do. Nevertheless, it is to be desired that every means should be taken to ascertain the relative height of the sea in various places so chosen as to test the truth of the views I have mentioned. The apparent connection between glaciation and submergence is now attracting notice in various quarters. Dr. Penck maintains that shifts in the relative level of sea and land go hand in hand with oscillations in the glaciation. In 1865 I called attention to this connection, and suggested what seemed to me to be a possible explanation of it (see *Journ.* of the Geol. Soc. vol. xxi. p. 178).

Penck's views, it will be seen, are somewhat different from those of Adhemar and Croll, to which he points out several objections. His memoir is entitled "Schwankungen des Meeresspiegels," and appears in the *Jahrbuch der Geograph. Gesellschaft zu München*, Bd. vii. 1882.

T. F. JAMIESON

Ellon, Aberdeenshire, July 31

Voice in Lizards

THE above heading in NATURE, vol. xxvi. p. 29, rather surprises me, as though voices in lizards were a recent discovery. The loud and plaintive "gui—gui—gui" made by the large land lizard of that name, has been well known to me for the last seventeen years, and is of course well known to every Assamese. The call is always heard in twilight, in the depths of the forest, and when once heard is not mistakable for that of any other animal. It is plain, monotonous, loud, and repeated with two second intervals some eight or ten times, when there is a pause of about two minutes, and it is repeated. For those who do not understand the Hunterian system of spelling I would write it gooee—gooee, the oo most prolonged. The gui is about 3 to 3½ feet long—from snout to tip of tail—which latter exceeds the body and head. Colour grey-green, with clear yellow scales here and there—at times grouped—and that gives a mottled appearance. The tail has a double row of sharp scale-spines along its crest, and if suddenly lashed can cut the skin of any bare-legged bystanders.

It lives in holes under, or in, tree stems, often as high up as 30 or 40 feet. The flesh is eaten and prized, the skin used as the membrane in some kinds of guitars. There seem several kinds, one of 3 or 3½ feet, another larger—both land lizards—a still larger kind frequents the rivers, up to 6 feet or more in length. It hisses like the larger snakes, and the peculiar call that gives it the name "gui," can be heard in still forest I should say a mile; one that repeats this monotonous call every evening is loud enough to be an annoyance at times, though it is over 500 yards off.

S. E. PEAL

Sibsagar, Assam

Halo

ABOUT 2 p.m. to-day a remarkable halo was visible here. The sky was partially covered with light cirrus clouds, and some small fleecy drift was rapidly moving from the north-west at a low altitude. I saw a bright bow at about 45° from the sun nearly due north, extending over a clear portion of the sky; this gradually extended till it formed a circle with the sun in the most southern point of its circumference. The width of the bow was rather greater than the diameter of the sun, the whole circle being, as near as I could judge, 45° or 50° in diameter. It was brilliantly white, brighter than the white of any clouds in the neighbourhood; it lasted perhaps fifteen minutes, and gradually broke up and faded. I could see no other interesting halo nor any appearance of parhelia.

W. A. SANFORD

Tynehead, Somerset, July 25

THE ELECTRIC PROPERTIES OF FLAMES

THE electric properties of flames have often invited the investigation of physicists, but the obscurity and contradictory nature of some of the phenomena have been such that in spite of a large number of researches no complete account of these properties has hitherto been given. Most of these researches are enumerated in a paper contributed by Prof. Holtz to Carl's Repertorium last year; but though Holtz has himself added to our knowledge of the electrical property of flames by his researches on the behaviour of flames when employed as electrodes, he left much yet to be investigated in this department.

The latest contribution to our knowledge of the subject appears in the current volume of Wiedemann's *Annalen der Physik und Chemie*, from the joint pens of Herren Dr. Julius Elster and Hans Geitel. As the results of their investigations go far to clear up some of the points which have hitherto been obscure or contradictory, some account of these investigations will probably not be unacceptable to the readers of NATURE.

The chief theories that have been advanced from time to time in explanation of the electrical properties of flames may be reckoned as three in number.

1. Pouillet in 1827 propounded the suggestion that the electricity of flame is due to the process of combustion as such, and therefore presumably analogous to the electrification observed by Volta to result when a burning coal or pastille is placed upon the cap of an electroscope.

2. Matteucci, in 1854, explained the phenomena by supposing that the flame acted upon the two metal electrodes (employed to test its electrification) as an electrolyte; in fact, that it acted as the acid between the two metallic plates of a voltaic cell; a view which practically agrees with that earlier propounded by Hankel.

3. Buff suggested that the explanation was to be sought in a thermo-electric difference between the two electrodes.

Sir William (Mr. Justice) Grove had shown moreover that when a platinum wire is bent so that one end of it stands in the tip of a flame, while the other is immersed in the flame near its base, a current of electricity is set up in the wire. This phenomenon might at first sight be thought to agree with an observation of Hankel, that a flame is "polarised" longitudinally; that is to say, Hankel found there is a difference of potential between the tip and the base of a flame, and this difference of poten-